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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/626,550	07/25/2003	Se-Yeul Bae	009844-0305239	9321
909	7590	10/18/2005	EXAMINER	
PILLSBURY WINTHROP SHAW PITTMAN, LLP			MALSAWMA, LALRINFAMKIM HMAR	
P.O. BOX 10500			ART UNIT	
MCLEAN, VA 22102			2823	
			PAPER NUMBER	

DATE MAILED: 10/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/626,550

Applicant(s)

BAE, SE-YEUL

Examiner

Lex Malsawma

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 5-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 5-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 and 5-8 are rejected under 35 U.S.C. 102(b) as being anticipated by **Aoki** (6,387,821).

Regarding claims 1 and 5-8:

Aoki discloses (in Figs. 1-4 and Col. 8, lines 18-65) a method of forming metal wiring in a semiconductor device comprising:

forming a bottom metal pattern 105 on a semiconductor substrate (Col. 8, lines 4-5);

forming a low-temperature oxide (HSQ) an insulating layer 106 on the semiconductor substrate including the bottom metal pattern, wherein the low-temperature oxide (HSQ) is formed at the temperature of 400 °C (Col. 8, lines 26-28) and having a thickness of 1200 nm (12000 angstroms);

forming a first photoresist pattern 107 (Fig. 2a) for forming via hole on the low temperature oxide 106;

forming an unfinished via hole by removing the low temperature oxide selectively for a prescribed thickness using the first photoresist pattern as a mask (Fig. 2b), wherein the unfinished via hole is formed to make the thickness of the insulating layer 106 remaining inside the via hole equal to the thickness of the upper part of the damascene contact (i.e., the thickness

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of remaining insulating layer 106 below the unfinished via in Fig. 3a is equal to the thickness of the upper part of the damascene opening in Fig. 3b), accordingly, the thickness of the low temperature oxide remaining inside the via does not exceed a predetermined thickness of an upper part of a damascene contact (NOTE: a “predetermined thickness” would be any thickness disclosed for the upper part of the damascene contact, therefore, Aoki shows that the “predetermined thickness” of the upper part of the damascene contact is not exceeded by thickness of the low temperature oxide remaining inside the via hole);

removing the first photoresist pattern 107 (Figs. 2a-2b);

forming a second photoresist pattern 108 for forming damascene pattern on the low temperature oxide around the unfinished via hole (Fig. 3a);

forming a damascene pattern by removing the low temperature oxide 106 selectively using the second photoresist pattern as a mask (Fig. 3b),;

removing the second photoresist pattern 108 (Figs. 3a-3b); and

forming a metal-wiring-via-damascene contact 111 by filling metal 111 (copper) in the damascene pattern, wherein the damascene contact is formed by dry deposition (i.e., sputtering) of metal on the insulating layer including the damascene pattern and the planarizing the metal 111 by CMP process (Figs. 4a-4b and Col. 8, lines 58-65).

Therefore, Aoki anticipates these claims.

Remarks

3. Applicant's remarks/arguments have been carefully reviewed and considered, but they are not persuasive for the following reasons. The amendment to claim 1 removes the prior

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limitation requiring the thickness of the low-temperature oxide be specifically less than a thickness of the upper part of the damascene contact; therefore, Aoki anticipates claim 1 (as currently amended) because Aoki discloses/shows (in Figs. 3a-3b) that the thickness of the low-temperature oxide is equal to a “predetermined thickness” of the upper part, i.e., in claim 1 (as currently amended), the thickness of the low-temperature oxide can now be equal to or less than a predetermined thickness of the upper part, where “a predetermined thickness” is essentially any thickness obtained for the upper part, e.g., once a thickness is obtained for the upper part, one could readily refer to the obtained thickness as “a predetermined thickness” for subsequent batches. Applicant’s remarks with respect to obtaining a desired sheet resistance has been noted; however, since the information presented in these remarks was not included in the specification as originally filed, it is not considered to be a critical aspect of the current invention, especially because it seems that the thickness relationship between the remaining portion of the low-temperature oxide and the upper part is no more than a preferred relationship. For example, note the current specification (page 4, lines 12-15), wherein it is disclosed, “[t]he remaining thickness t of the insulating layer 35 when the unfinished via hole 39 is formed is preferably equal to or smaller than thickness $t1$ of an upper part of a metal damascene contact 45 shown in Fig. 9”, and there is no disclosure indicating the criticality of this thickness relationship, especially in the manner suggested by the remarks. Therefore, all pending claims are currently rejected under 35 USC § 102

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lex Malsawma whose telephone number is 571-272-1903. The examiner can normally be reached on Mon. - Thur. (4-12 hours between 5:30AM and 10 PM).


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lex Malsawma *LM*

October 11, 2005


W. David Coleman
Primary Examiner